WATER-RELATED INCIDENTS IN MARICOPA COUNTY, 2015

Annual Report for the Drowning Prevention Coalition of Arizona

ARIZONA DEPARTMENT
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Bureau of Public Health Statistics

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WATER-RELATED INCIDENTS IN MARICOPA COUNTY, 2015

SUMMARY

This report describes water-related incidents that have activated the *9-1-1* emergency system. Data in this report are derived mainly from case reports submitted by fire departments in the Phoenix metropolitan area. In 2015 the fire departments and news clips reported 67 serious water-related incidents in the metro area among persons of all ages. Children 0-4 years of age accounted for 28 of these incidents, 22 of which occurred in swimming pools. Of the 28 young children, 8 are known to have died (7 due to incidents occurring in pools). Of the remaining children, many survived the incident without apparent medical complications, but this year 2 children sustained an impairment. Although there has been a 60% increase in the number of young children who live in the county since 1990, the count of serious incidents in swimming pools has remained fairly constant.

In 2015 the child deaths in pools occurred in both warm and cold months. The Maricopa drowning death rate for children 0-4 years of age in 2015 in all bodies of water decreased to 3.3 deaths per 100,000 children, and has been holding relatively steady since 2006. The rate of deaths in swimming pools also remains steady, as has non-pool related deaths.

While the drowning rates have markedly decreased since the 1980s and 1990s, better control of this cause of injury and death appears possible. Emphasis on issues relating to supervision of children will have the greatest impact on nonfatal incidents, especially in the summertime. But, to prevent child drowning deaths (in contrast to incidents in which the child survives intact) continued attention needs to be paid to the placement of pool barriers, self-closing gates with latches, and their maintenance. Community campaigns are needed to address the incidents occurring in home pools in the summer time. Community-wide promotion of swim lessons remains an untried intervention.

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INTRODUCTION

In the mid-1980's the drowning death rate of Arizona's preschoolers ranked first in the nation.[1] Warm weather, long summers, and the presence of more than 300,000 residential swimming pools make Arizona prone to water-related incidents. Furthermore, death is just one outcome of water-related incidents: in about 9% of incidents the child survives, albeit with some degree of neurological impairment.[2]

To address the problem of water-related incidents in the Phoenix metropolitan area (called "Maricopa County" in this report), the Drowning Prevention Coalition of Arizona was formed in 1988. This Coalition is comprised of municipal fire departments, hospitals, the state and county health departments, community organizations, pool builders, suppliers of pool safety equipment, parents of drowned victims, businesses, and others.

The Coalition's website www.preventdrownings.org and a community partner's website http://childrensafetyzone.com provide stories about individual incidents. These stories convey the often tragic impact to a child and family. The following report aggregates the individual stories and reports from first responders and the media to describe the patterns and trends. The information is useful in understanding the risk factors and in designing community-level approaches to reduce these incidents.

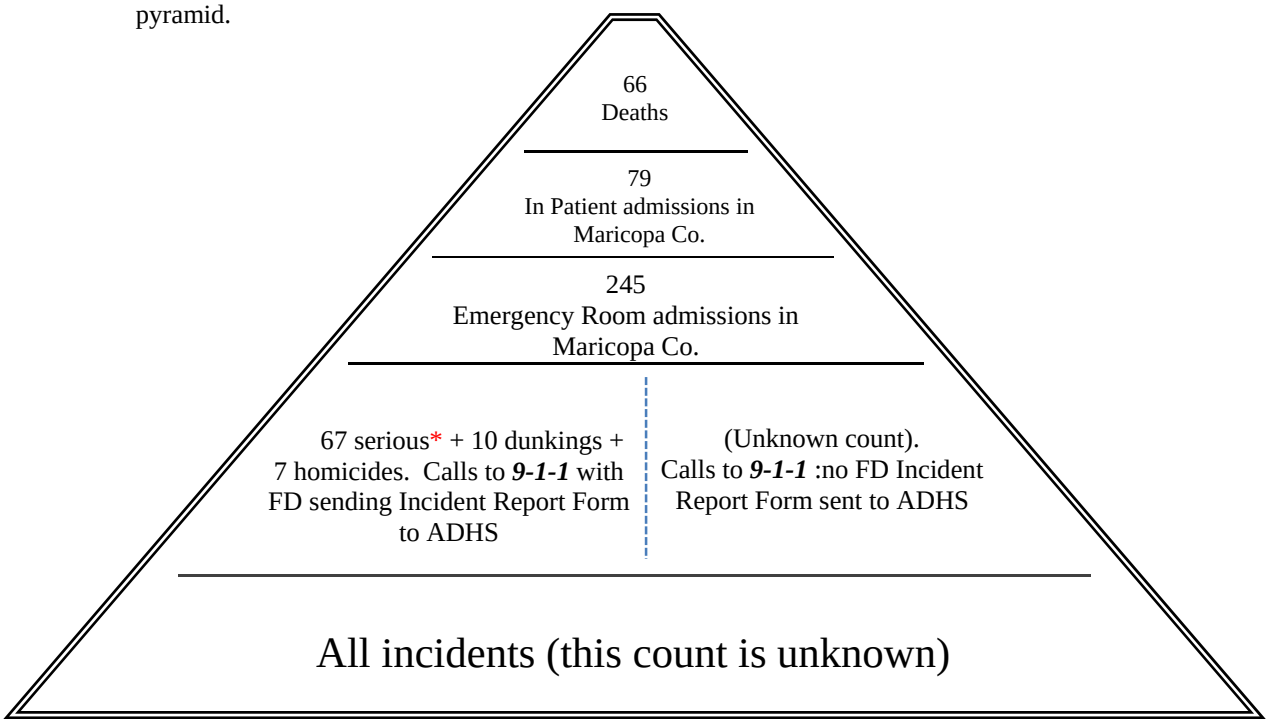
The following report presents the data collected for 2015, and compares the findings to those in previous years. Much of the report focuses on children under five years of age, and specifically on incidents occurring in swimming pools.

DIMENSIONS OF THE DROWNING DATA PYRAMID

With various data systems now in place (such as fire department reports and news clippings; hospitalization data; death certificates) we see a clearer picture of the magnitude of water related incidents and drowning deaths in Maricopa County. By using the data obtained from the various data systems the layers of data can be seen in following the injury pyramid.

[1] Arizona Department of Health Services. Unintentional Drowning Deaths, Arizona, 1980-1989. Office of Planning & Health Status Monitoring, October 1990.
[2] Beyda, D. and Masuello, J. Phoenix Children's Hospital. Oral communication, July 1999.

Injury Data Pyramid. Estimated count of water-related events at various levels of the injury pyramid for events occurring in Maricopa county in 2015. These data include persons of all ages. The definitions of events are not entirely comparable between the levels. Most of this annual report focuses on the incidents indicated by "*" in the pyramid.



METHODS AND DATA SOURCE

Case Definition: In this report a water-related incident is defined as an incident in which a fire department (FD) responded to a *9-1-1* emergency call originating in Maricopa county. We include in the analysis any incident in which the victim was given CPR, was not breathing, or was submerged or not struggling when retrieved from the water. Some of these cases die the same day or at a later time; some fully recover. We exclude from analysis any incident that did not appear to be life-threatening; for example, we exclude from analysis an incident in which a victim was struggling and did not require CPR.[3] We also exclude reports in which homicide or suicide appeared likely.

Procedures: Since 1988, the Arizona Department of Health Services (ADHS) has monitored water-related incidents as reported by local fire departments. The fire

[3] These relatively minor *9-1-1* incidents that were excluded sometimes are called "dunkings, close calls, or near misses." In recent years, the count of these minor incidents ranged from 22 to 54; in 2015 there were 10 such incidents. ADHS requests that fire departments submit all such incidents, but we exclude these minor incidents from further analysis in the yearly reports. Obviously trivial incidents that would not even qualify as "dunkings" are not submitted by most fire departments.

departments usually are first on the scene of *9-1-1* calls and are generally able to provide information about the event from information provided by witnesses. We assume that very few serious incidents occur without activation of *9-1-1*. The fire departments submit case reports on a standard Incident Report Form (see appendix) developed in conjunction with the Coalition. The reported data items include the age and gender of the victim, the location of the incident, and the apparent circumstances surrounding the event. The ADHS Bureau of Public Health Statistics receives and analyzes these case forms.

So far, the data inconsistently includes the calls to the Maricopa County Sheriff's Office, which responds to incidents on the surrounding lakes, or the nearby Salt or Verde Rivers. These popular recreational areas are located just outside of the Phoenix metropolitan area. Incidents occurring outside the boundary of Maricopa county are excluded in this report; however, a separate report is prepared for Pima county.

Starting with the 2008 data the ADHS staff who enter data has been reduced to one person (TJF) who receives and codes the forms of each reported incident. Usually, fewer than six incidents per year are questionable as to whether the incident was life-threatening. The fire departments do not submit reports of calls to *9-1-1* that are canceled. This data surveillance system relies mainly upon fire departments to report all the serious cases occurring within their jurisdictions.

Supplemental sources: In conjunction with the Coalition, the surveillance system searches the local newspaper (the Arizona Republic) and online postings of television stations daily for reports of water-related incidents. When found, articles are downloaded[4] or clipped, and attached to the fire department reports. Rarely, there is no associated fire department report. If a report from the fire department is missing, then ADHS contacts the fire department to request a submission. If the fire departments do not submit a case report, then we assume the case was serious, and we use the information from the news clipping to create a case report. We use death certificates only to document the outcome status for incident cases reported by fire departments or media sources.[5]

Analysis: Analysis of data was performed using Microsoft Access on the database of the 3,498 records entered since 1988. We excluded the apparently minor (non life-threatening) incidents,[3] also called "dunkings", from subsequent analyses reported herein. As previously stated, we also excluded 7 incidents that appeared non accidental. The database was managed during 2010-2012 by a separate office at ADHS and this current report shows some discontinuity in the data for those years; the graphs and tables that follow may show dips in ascertainment that reflect the less intense tracking during those years.

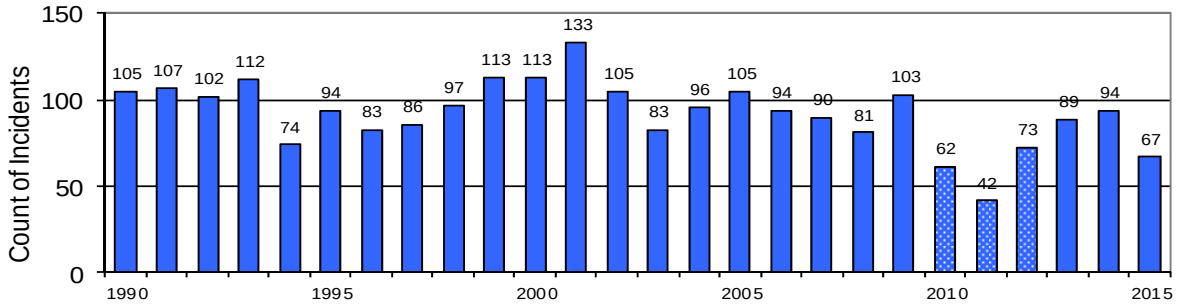
[4] The Children's Safety Zone collaborates with local fire departments, hospitals and media to gather statistics and stories on water related incidents and fatalities in Arizona. See http://childrensafetyzone.com/go/

[5] We do not use death certificates to supplement the count of incidents reported by fire departments. However, as explained in a later section, we use death statistics as an independent method of tracking drowning trends.

FINDINGS

In 2015, fire departments and the news clips reported 67 serious water-related incidents in Maricopa County among persons of all ages. Twenty-incidents in 2015 were reported only in the news clips, an increase compared to previous years. The count of 67 reported, serious incidents in 2015 was notably fewer compared to the annual count of cases since 1990 (see Figure A).

Figure A. Count of reported, serious water-related incidents in Maricopa County among persons of all ages in all bodies of water. An incident may lead to an outcome of death, or survival with impairment or no impairment.



The distribution of the 67 incidents in 2015 according to the city and age of the victim is shown in **Table 1**.

Table 1. Water-related incidents reported for 2015 according to age group and city of incident in Maricopa County. Only life threatening incidents are included in the analysis.

	Years of Age of the Victim						
City of Incident	0-4	5-14	15-34	35-64	65+	Unknown	Total
Avondale	1	1	0	1	0	0	3
Buckeye	1	0	0	0	0	1	2
Chandler	2	0	0	0	0	0	2
El Mirage	1	0	0	0	0	0	1
Gilbert	1	2	0	0	0	0	3
Glendale	0	0	0	0	1	0	1
Mesa	2	0	0	0	0	0	2
Maricopa Co, other	1	1	2	1	0	2	7
Peoria	2	0	0	1	0	0	3
Phoenix	14	3	3	6	4	0	30
Salt River	0	0	2	0	0	0	2
Scottsdale	0	0	0	0	2	0	2
Sun City	0	0	0	0	1	0	1
Surprise	1	0	0	1	0	0	2
Tempe	2	0	2	0	0	1	5
Tolleson	0	0	0	1	0	0	1
All Areas	**28**	**7**	**9**	**11**	**8**	**4**	**67**

The body of water of the incidents according to age group is presented in **Table 2**. Most incidents took place in swimming pools. Pools, either above ground or in ground, were involved in 45 (67%) of the 67 events. Twenty-two of the 45 incidents in pools involved children aged 0-4 years. Rivers and lakes (9 incidents), bathtubs (5 incidents), hot tub spas (3 incidents), and canals (4 incidents) were the next most common places for water-related incidents among all ages.

Table 2. Water type by age group, 2015. Only life threatening incidents are included in the analysis.

	Years of Age of the Victim						
Water type	0-4	5-14	15-34	35-64	65+	UNK	Total
Bathtub	3			2			5
Bucket							
Canal/Irrigation Ditch	1			1		2	4
Fish/Decorative Pond							
Other							
Pool, in ground	22	6	4	3	8	1	44
Pool, above ground				1			1
River/Lake		1	4	3		1	9
Spa	1		1	1			3
Toilet							
Unknown	1						1
All water bodies	**28**	**7**	**9**	**11**	**8**	**4**	**67**

Young Children

Children, ages 0-4 years, comprised the largest group experiencing a water-related incident. Although older individuals are equally important to consider in terms of loss of life, society generally feels a greater sense of responsibility to prevent injury to persons in the youngest, highly vulnerable, age group. The remainder of this report analyzes the findings among the 0-4 year old age group.

Some data elements were not collected in the early years of our surveillance, and space considerations make it difficult to include all years of data. For those reasons, the graphs that follow may display a variety of time periods. For a few, selected graphs we display data according to the child's outcome: "died"; "survived but with impairment"; and "survived in apparently normal condition."

The distribution of cases among single ages of the 0-4 year old group is shown in **Figure 1**. Among children 1-4 years old, the count of incidents in swimming pools far overshadows the count in all other bodies of water combined. Among infants (i.e., under one year of age) bathtubs are the most common water body in which incidents occur. **Figure 1b** shows the count when the outcome was death or impairment.

Figure 1. Count of incidents according to the body of water in which life threatening incidents occurred, by single age category, reported in Maricopa County, 1990-2015. Outcome status: all.

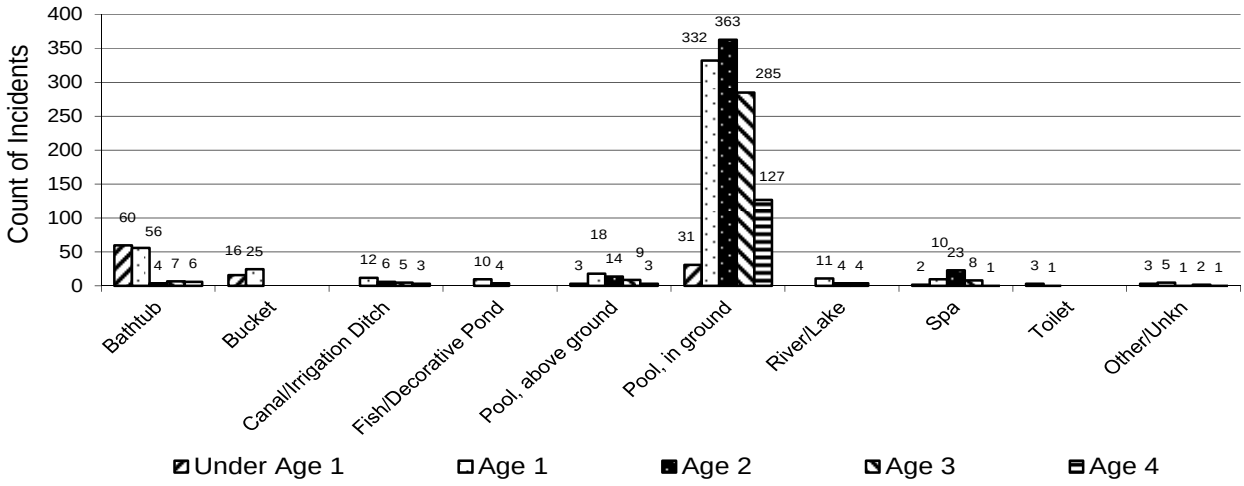
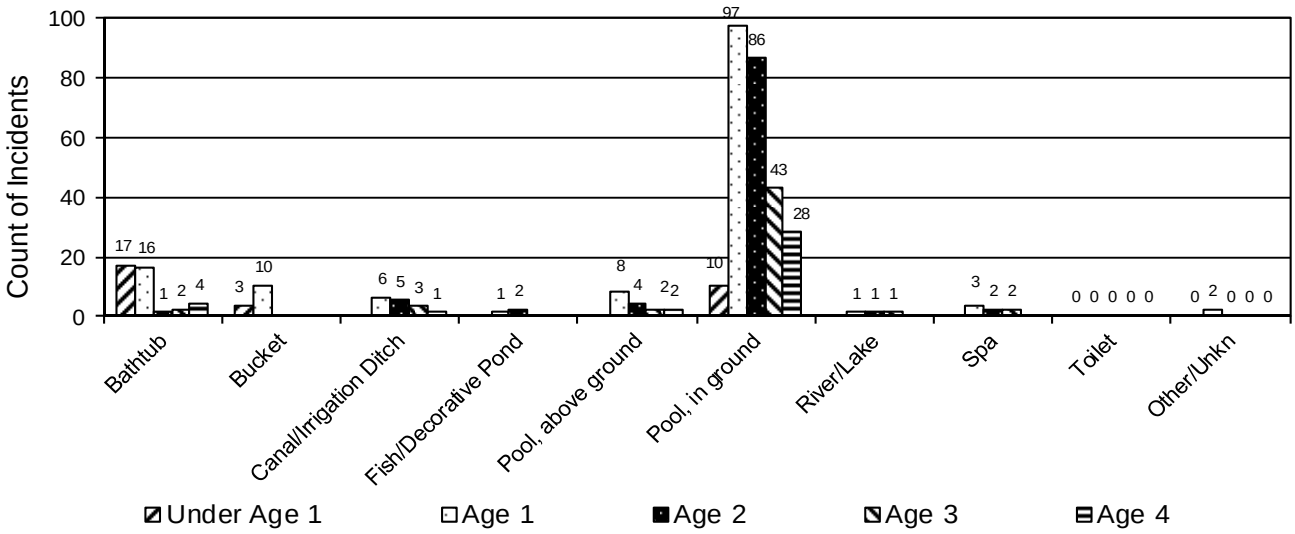


Figure 1b. Count of incidents according to the body of water in which the incident occurred, by single age category, reported in Maricopa County, 1990-2015, where the child's outcome was death or impairment.



The next tables and figures provide information about incidents occurring in swimming pools for this age group. **Figure 2** shows the count of pool-related incidents reported during the previous 28 years. In 2015, the count (22) appears considerably lower than in previous years. Because of the increasing population of children residing in the metro area (from 170,182 resident children in 1990 to 271,802 in 2015 – a 60% increase) – **Figure 3** displays the rate of pool incidents, expressed per 100,000 children residing in Maricopa County. The rate of 8.1 for 2015 is lower than previous rates. The inverse of this rate (100,000 / 8.1) reveals that for every 12,346 children, at least one child experienced a life-threatening pool incident in 2015 in Maricopa county.

Figure 2. Count of life-threatening incidents in pools, by year, among 0-4 year olds. Outcome status: all.

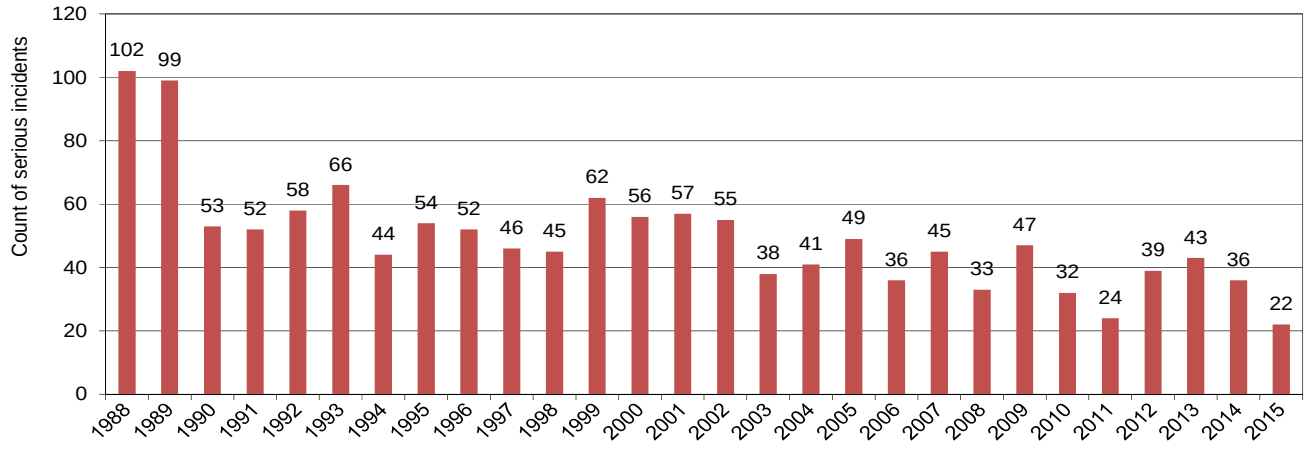
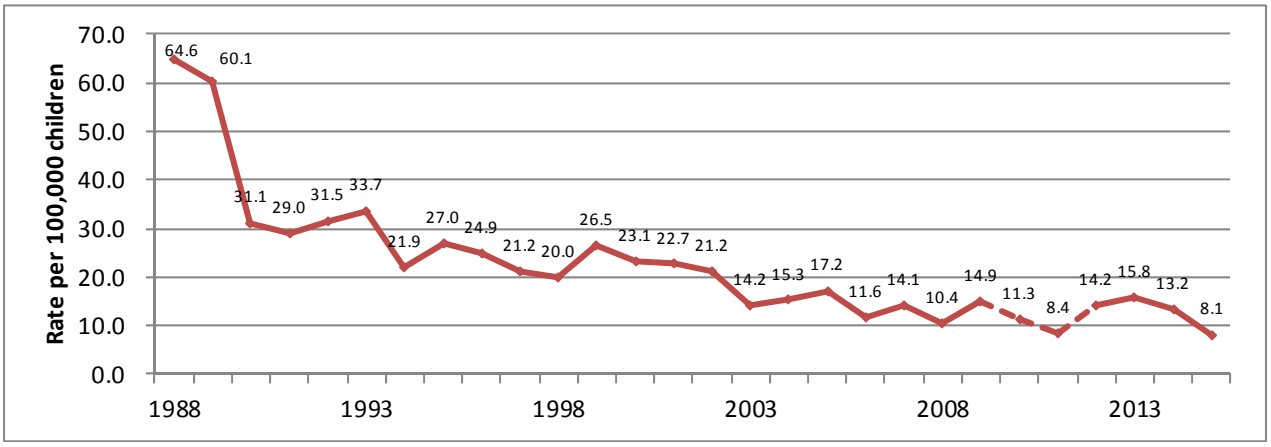
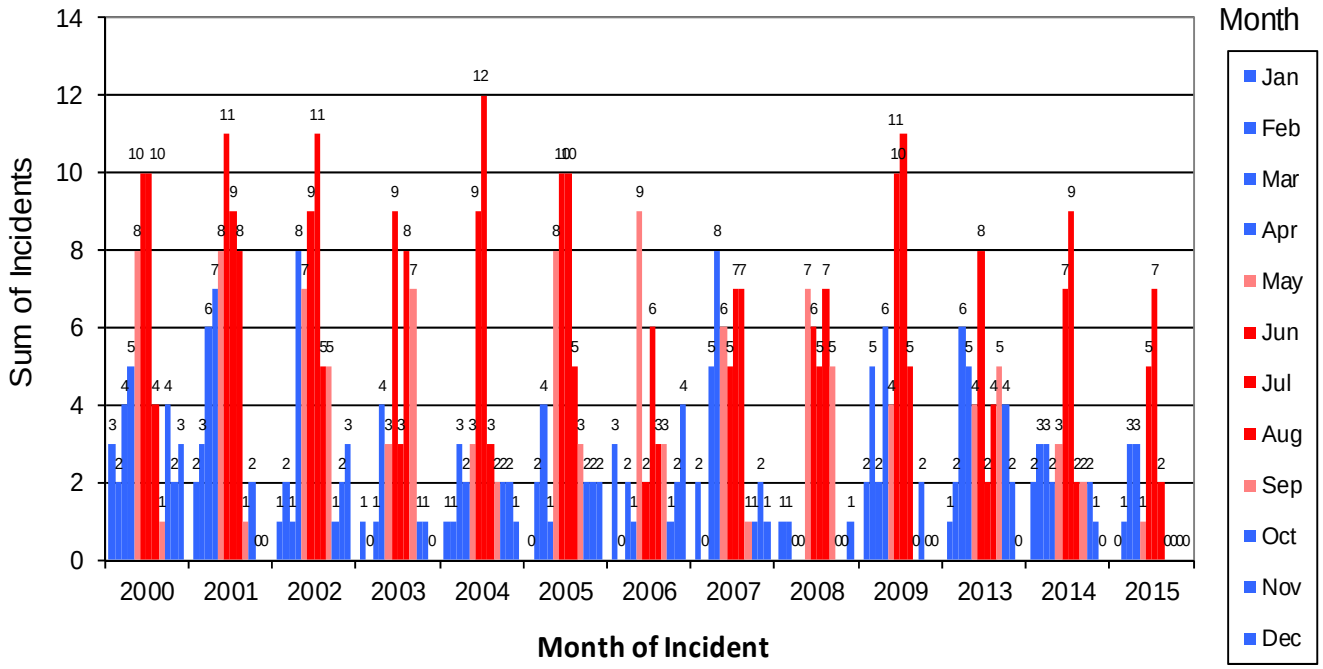


Figure 3. Rate (per 100,000 children aged 0-4) of life threatening pool incidents occurring in Maricopa County. The rates consider the increasing population of children in the county. The numerators for the rates are the counts of incidents (shown in Figure 2) regardless of the county in which the child resided. Outcome status: all.



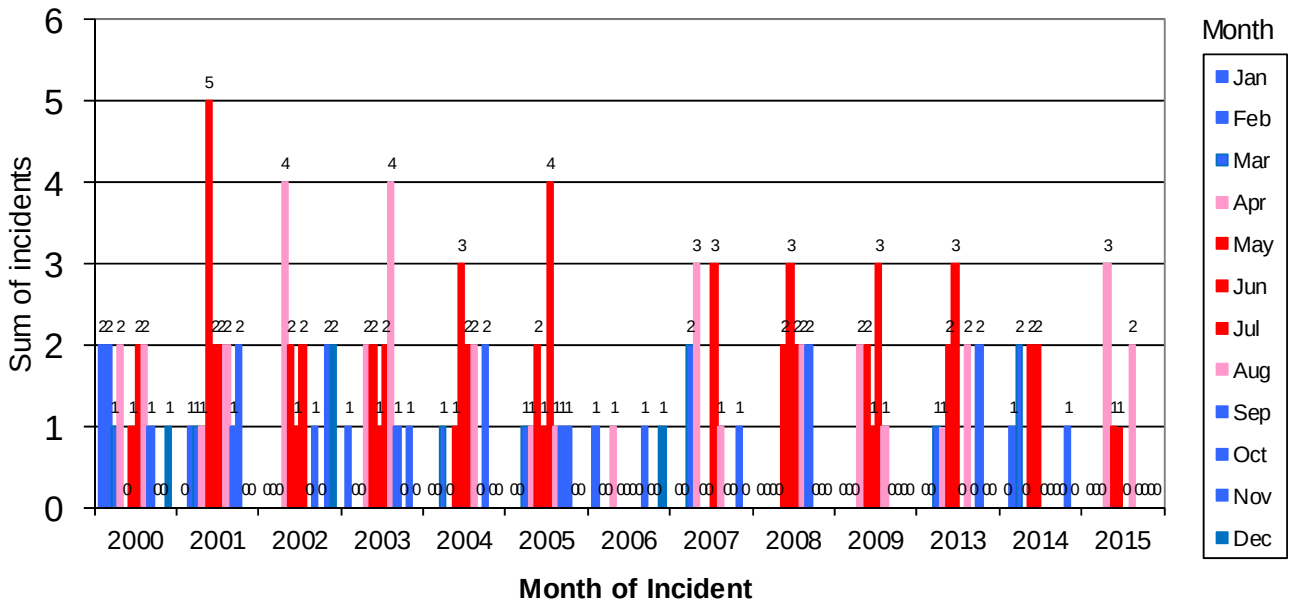
The occurrence of incidents by month is shown in **Figure 4**. We note the typical pattern seen in previous years, with the number of pool-related incidents peaking during the summer months of June, July, and August. In 2015 the counts were below the Coalition's goal of seeing fewer than 10 serious incidents in any month. In 2006 the fire departments reported not a single pool-related death all summer (see **Figure 4b**).

Figure 4. Monthly sum of life-threatening swimming pool incidents, 0-4 year olds, Maricopa County. Outcomes: all.



Source: DPCCA Fire Depts and newsclippings.

Figure 4b. Monthly sum of incidents in pools in which the child's outcome was "died."



Source: DPCCA Fire Depts and newsclippings.

As shown in **Table 3**, boys comprised a majority of the pool-related victims in 2015. This finding has been present in most years.

Table 3. Gender of 22 children, 0-4 years old, involved in pool-related incidents, 2015. Outcome: all.

Gender	Count	(%)
Male	16	73%
Female	6	27%

Race and ethnicity are difficult variables to analyze because of the way that Hispanic ethnicity is often considered a race group. Currently, most demographers consider Hispanic as an ethnic group, not a race group. For analysis here, we count Whites as either Hispanic or non Hispanic. The remaining races are counted regardless of Hispanic ethnicity. **Table 4** presents the tabulation.

Table 4. Race and ethnic characteristics of children, 0-4 years of age, involved in water-related incidents in pools in 2015. Outcome: all.

Race/Ethnicity	Count	%
Asian	0	0.0%
American Indian	0	0.0%
Black	0	0.0%
Hispanic	4	18.2%
White, non Hispanic	8	36.4%
Other	0	0.0%
Unknown	10	45.5%
TOTAL	**22**	**100.0%**

The 2000 Census found that 40.1% of children age 0-4 residing in Maricopa County were Hispanic.[6] The proportion of Hispanic families that actually have pools is not known, but is probably less than the population as a whole. **Table 4** shows that race and ethnicity is often unknown.

[6] To calculate the percentage of Hispanic children in Maricopa County, the numerator was derived from the U.S. Census Bureau at http://factfinder.census.gov/ and the denominator was derived from the Arizona Office of Economic Opportunity at https://population.az.gov/census-data

Table 5 presents the incidents according to the body of water and the site of the 22 incidents involving children between the ages of 0 and 4. The most common site of incidence was an in-ground pool located at the victim's home (12 incidents). In three incidents the site was a relative's pool. One incident occurred at a friend's pool. The three bathtub incidents also occurred at the victim's home.

Table 5. The body of water according to the site of incident for children, 0-4 years of age. Life-threatening incidents only, Maricopa County, 2014. Outcomes: all.

Body of Water	Friend's Home	Neighbor's Home	Public & Semi-pub	Relative's Home	Victim's Home	Other / Unknown	All Sites
Bathtub					3		**3**
Bucket							**0**
Canal/Irrigation Ditch						1	**1**
Fish/Decorative Pond							**0**
Pool, above ground							**0**
Pool, in ground	1		2	3	12	4	**22**
River/Lake							**0**
Spa				1			**1**
Toilet							**0**
Other/ Unknown/ Missing						1	**1**
TOTAL	**1**	**0**	**2**	**4**	**15**	**6**	**22**

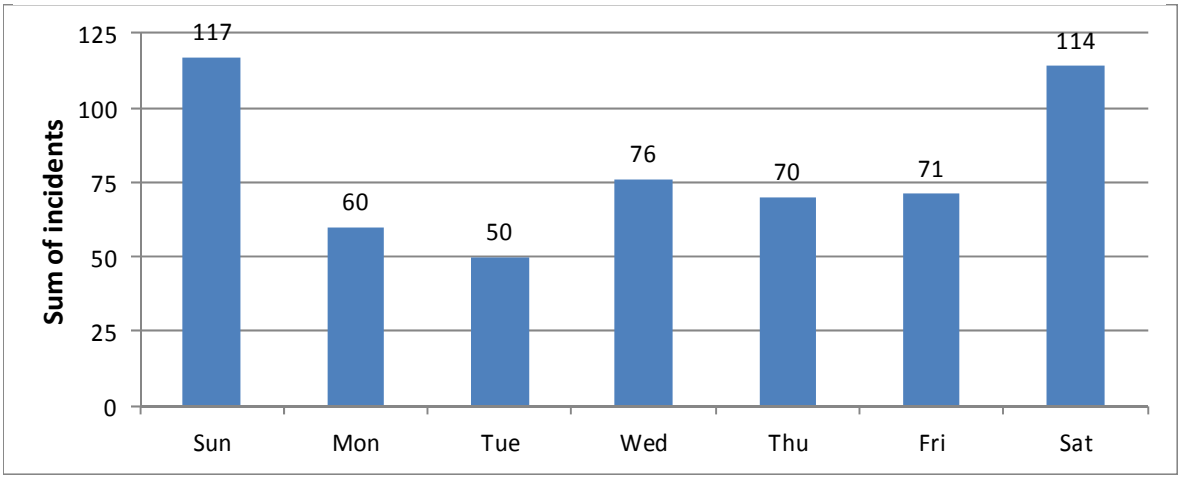
Table 6 presents the type of dwelling where the incidents took place. Eighteen (82%) of the 22 pool incidents occurred at a single family home. Just two incidents in a pool or spa occurred in apartments.

Table 6. The body of water according to the type of dwelling for children, 0-4 years of age, who experienced a water-related incident in 2014. Outcomes: all.

Body of Water	Apt/ Condo	Hotel/ Motel	Single Home	Multiple Units	Trailer/ Mobile	Unknown/ Other/NA	Total
Bathtub	2		1				**3**
Bucket							**0**
Canal/Irrigation Ditch						1	**1**
Fish/Decorative Pond							**0**
Pool, above ground							**0**
Pool, in ground	1		18			3	**22**
River/Lake							**0**
Spa	1						**1**
Toilet							**0**
Other/Unknown						1	**1**
Total	**4**	**0**	**19**	**0**	**0**	**4**	**28**

Figure 5 displays the occurrence of pool-related incidents by day of week. Incidents occurred on every day of the week, and there was no day when vigilance would not have been important. The graph shows that pool incidents tend to occur more often during the weekend.

Figure 5. Day of the week of life-threatening pool incidents among children 0-4 years old, Maricopa County, 2000-2009; 2013- 2015. Outcomes: all.



The distribution of pool incidents by hour of the day is shown in **Figure 6**. Not surprisingly, the incidents occurred when children were likely to be awake. The peak time for an incident in the 0-4 year old age group was in the mid to late afternoon.

Figure 6. Life threatening pool-related incidents by hour of the day among children 0-4 years of age. Cumulative count, 2000-2009; 2013- 2015, Maricopa County. Outcomes: all.

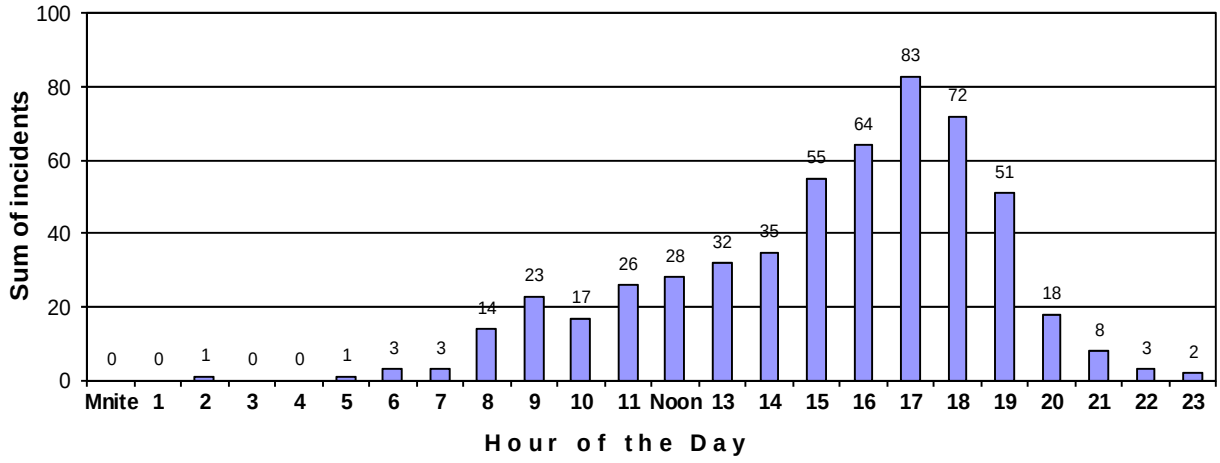


Table 7 presents information about the type of clothing worn at the time of a pool-related incident. In at least 8 (36%) of the incidents, the children were not wearing swimming attire. These incidents did not occur in a swimming situation; rather, they occurred at a time when the children were not expected to be in or near the pool.

Table 7. Clothing worn by children ages 0-4 who experienced a life threatening water related incident in a pool, 2015. Outcomes: all.

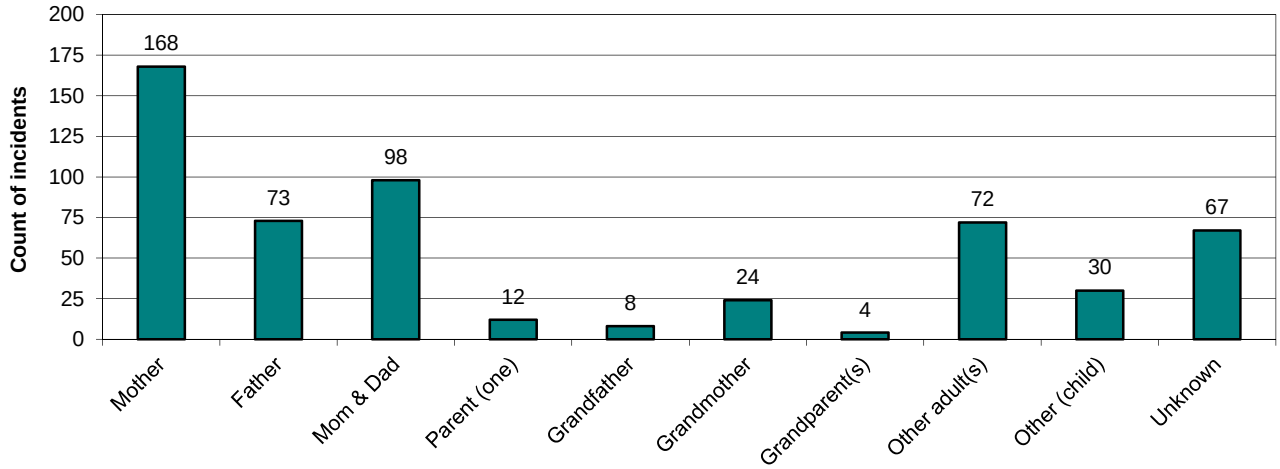
Clothing	Number	%
None	1	4.5%
Swimwear	5	22.7%
Other clothes	8	36.4%
Unknown	8	36.4%
Total	22	100.0%

Supervision

A major purpose of this surveillance system is the identification of the factors surrounding water-related incidents in young children. To assist in this effort, the personnel from the responding fire departments attempt to determine the apparent circumstances surrounding each event. In gathering this data, a firefighter might ask about supervision at the time of the incident and look for breaches in layers of protection that likely allowed a young child to access the pool.

Information about the supervisor of the victim at the time of incident is shown in Figure 7. Since 2000, a mother or father or both was supervising the child in 351 (63%) of the 558 life-threatening incidents involving children 0-4 years old. In 205 (37%) incidents, the supervisor was someone other than the child's parent. This seems to be a higher proportion than the amount of time that children in this young age group spend outside the supervision of a parent. Thus, babysitters, grandparents, and other supervisors also need to be even more alert to the potential for a pool-related incident to occur.

Figure 7. Cumulative count of presumed supervisor in life-threatening pool incidents involving children, age 0-4, 2000-2009, 2013-2015. Outcomes: all.



Outcome Status

To determine outcomes of the reported incident cases, we used the data reports from fire departments, and supplemented them with data from death certificates and other sources. At least 8 of the 28 young children reported as experiencing a serious water-related incident in 2015 have died (see **Table 8**). Seven children died from incidents in pools, and one from an incident in a bathtub Of the 28 children, 11 had no reported impairment when released from the hospital. We note two documented or presumed cases of neurological impairment in this age group in 2015; this count is similar compared to the number with impairment seen in previous years.

Table 8. Outcome status of children 0-4 years of age reported as having a life-threatening water related incident in 2015.

	Outcome Status				
Water type	Unknown	Died	Impairment	No Impairment	**Total**
Bathtub		1		2	**3**
Bucket					**0**
Canal/Irrigation Ditch	1				**1**
Fish/Decorative Pond					**0**
Other & Unknown				1	**1**
Pool, above ground					**0**
Pool, in ground	6	7	2	7	**22**
River/Lake					**0**
Spa				1	**1**
Total	**7**	**8**	**2**	**11**	**28**

Concerns about confidentiality make it difficult to properly document the outcome of cases that enter the medical care system. The outcome status of 7 of the 28 children was unknown. Our linkage to hospital discharge records allows assignment of a presumed outcome status to many cases that the firefighters have not been able to follow up. Since firefighters try to obtain the follow-up status on cases which have not responded to their resuscitative efforts, we speculate that in most cases a follow-up status of “unknown” means that the child probably recovered well.

The narrative section of the incident report form often provides additional information concerning the incident. This narrative section reveals that a family member or other person often resuscitated the child at the scene by promptly administering CPR when the child was pulled from the water. It is our belief that this immediate resuscitation is a vital step in stabilizing the child and counteracting the detrimental effects of the submersion. However, we cannot determine whether prompt CPR leads to the survival in a vegetative state of some children who otherwise would have died.

In assessing the 558 serious, reported incidents in pools from 2000-2009 and 2013-2015 we note the following outcomes: 25.4% died; 3.9% had a neurological or other impairment at last contact (usually at the time of discharge from the hospital); 43.0% were reported as normal (usually as determined at time of discharge from the hospital); and 27.6% had an unknown or undocumented outcome. Currently, we do not have resources to conduct a longer term assessment of the outcome status, such as educational achievement, of the surviving children.

Attributed Cause

Upon review of the incident form, we assign a single, "attributed cause" of each pool incident to one of the following six categories:

- No barrier to pool
- Inadequate fence
- Gate or latch failed or was propped open
- Back safety door or latch failed
- Supervision issue
- Other or unknown.

This information is further classified into events that occurred during the seven "cold" months (October through April), and the five "warm" months (May through September).

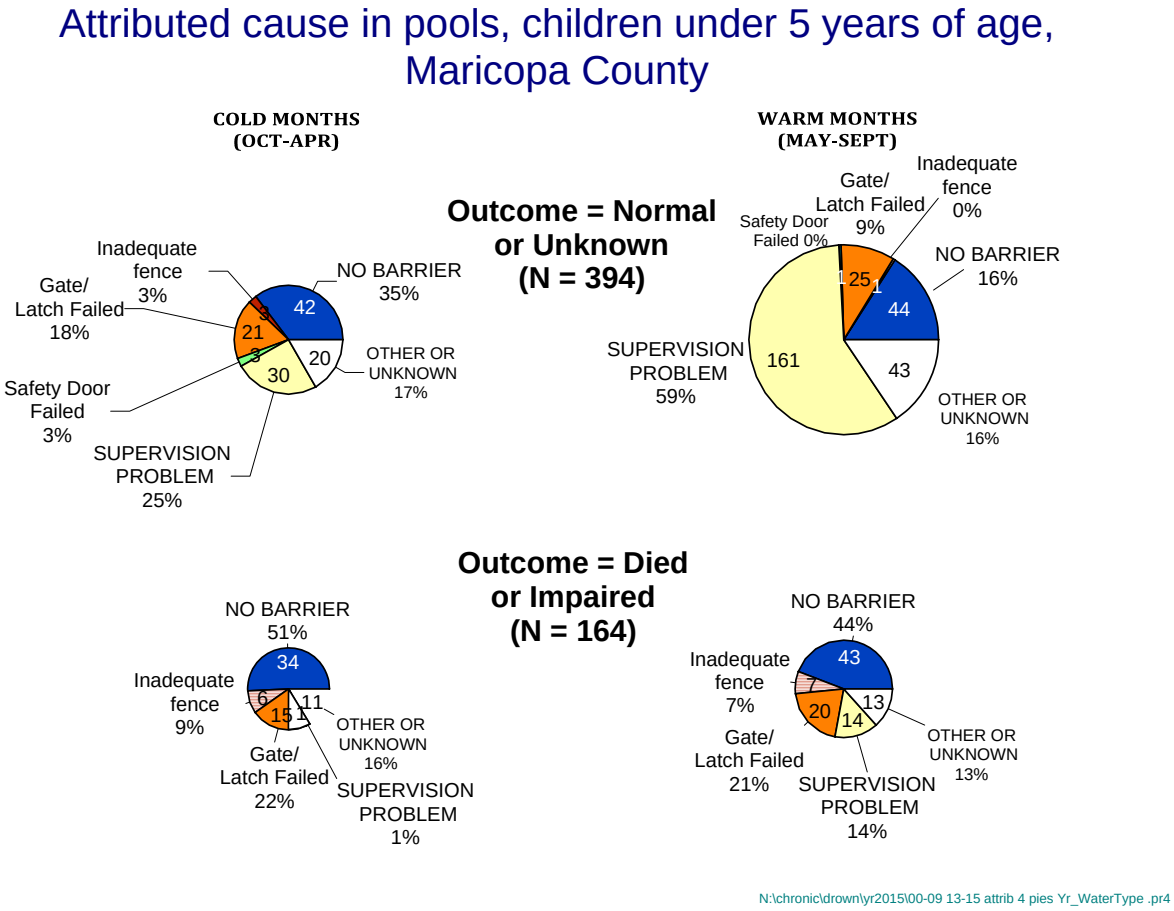
Similarity to Arizona Child Fatality Review data

The findings in our analysis are similar to that of the ADHS Arizona Child Fatality Review (CFR) Program. The CFR program has published their findings of drowning of young children, 1995-1999, and reported that only 4 of 81 drowning **deaths** of children less than 5 years of age occurred in backyard pools in which it was known that there was an adequate pool fence that had a properly functioning locked gate.[8]

A comparable analysis of our data, looking specifically at the children who died or were impaired, yields similar findings. To relate the incidence data reported by fire departments to the mortality data from CFR, we combined the categories of the 156 incidents occurring in 2000-2009, 2013, 2014, and 2015 where the child's outcome was "died (136 incidents) or impaired (20)." For additional comparison, we also analyzed the combined category of 381 incidents where the outcome was "normal (233) or unknown (148)." As in previous reports, we display the findings according to season (warm or cold). The results are shown in the four pie charts of **Figure 8**.

[8] Rimza ME, Schackner RA, Bowen KA, Marshall W. Can Child Deaths Be Prevented? The Arizona Child Fatality Review Program Experience. Pediatrics. 2002; 110(1). www.pediatrics.org/cgi/content/full/110/1/e11

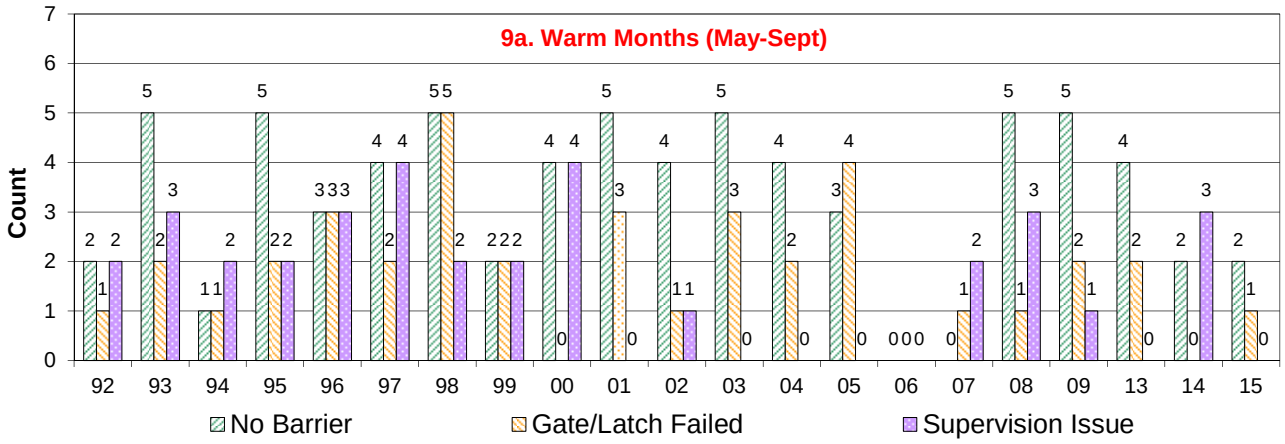
Figure 8. Comparison of the single attributed cause of incidents in pools, according to time of year (cold vs warm months) and outcome of the child (normal and unknown vs. died and impaired). This figure analyzes incidents occurring in 2000-2009, 2013, 2014, and 2015. Data are derived from reports submitted by fire departments in Maricopa County.

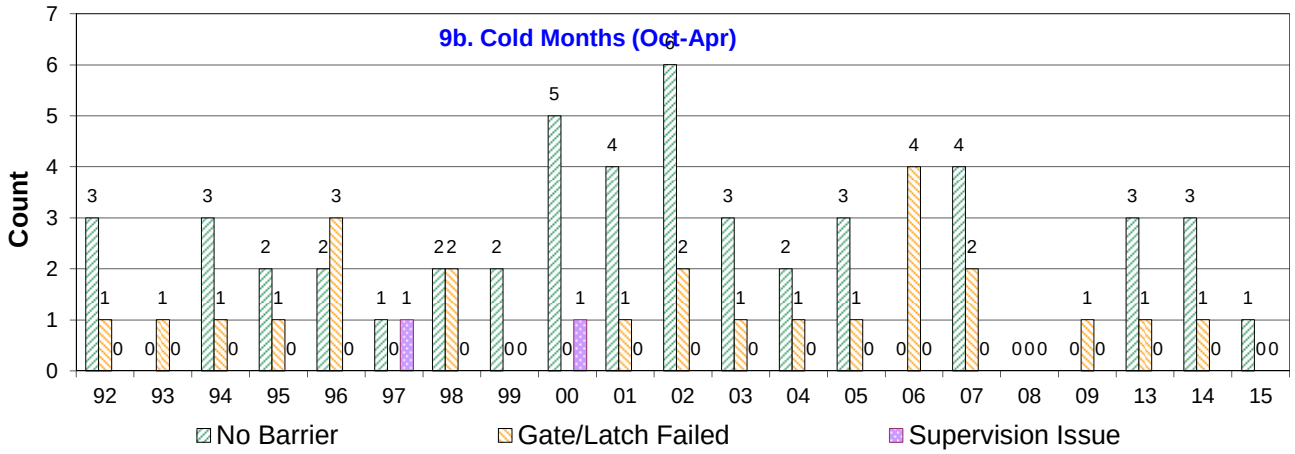


The roles of supervision and barriers differ for the outcome categories. The role of barriers (absent or failed) among cases whose outcome is "died or impaired" markedly differs compared to those cases whose outcome is "normal or unknown." Absent barriers appear to be a significantly more prominent factor in cases where the child died or was impaired than is supervision. On the other hand, supervision is the predominant factor in warm month incidents in which the child survived with normal or unknown outcome. In cold months, **Figure 8** shows that an absent barrier is the major factor regardless of outcome. The data here support the findings of the CFRT regarding the role of inadequate barriers as a major factor that contributes to child drownings in swimming pools.

Figures 9a and **9b** present data on the trend of the attributed cause of pool-related incidents during 21 years of observation. As noted above, the attributable cause is best analyzed by excluding cases in which the outcome is "normal" or "unknown." An interesting and probably more relevant pattern is noted by analyzing the cases where the child's outcome is death or impairment. Approximately 7-10 deaths occurred annually from pool incidents in warm months, and about 4-5 deaths annually from incidents that occurred in cold months (see previous Figure 4b). The counts swing widely from year-to-year because the counts are relatively small. From these data we could not discern a *trend* in the count of attributed causes in warm months. Similarly, for events occurring in cold months (Figure 9b) we hesitate to draw conclusions about a time trend because the counts are so small and year-to-year variability so great.

Figures 9a (warm) and 9b (cold). Trend of attributed causes (expressed as the count of all cases in the warm or cold season) of pool incidents in Maricopa County involving children 0-4 years of age in which the outcome of the incident was death or impairment. The graphs do not show the counts of the few cases attributable to "Inadequate barrier" and "Other & Unknown."





LIMITATIONS OF ACCURACY OF INCIDENCE DATA

Our surveillance system relies mainly upon voluntary reporting by fire departments and is subject to under-reporting if they reduce their participation in submitting the report forms. The downturn in the local economy and municipal revenues since 2008 and cutbacks in staff at fire departments clearly affect their ability to report cases.

The surveillance system assumes that few serious water-related incidents occur without the activation of the *9-1-1* system. However, this assumption has not been rigorously tested. Cases that generally lack a fire department report include those that are obviously dead when the law enforcement or EMS first responders arrive on scene, crime scene cases, and cases under the jurisdiction of the sheriff's office or a tribal government.

One of the ways we evaluate completeness of case ascertainment is by matching the case reports to a list of cases discharged from hospitals. For 2015 we note 4 child cases in Maricopa county, hospitalized for 3 or more days or who died, that were not captured by the incidence reporting system.[9]

Information from 9 death certificates (described below) reveals that just 1 child drowning death in 2015 from incidents in Maricopa county was not included in the reports we received from fire departments or from news clippings.[9] For comparison, the incidence data recorded 8 deaths of children in this age group for incidents occurring in 2015, and we matched a death certificate for all eight of these incident cases.

DEATH CERTIFICATE DATA

Death certificates provide an independent data source to measure the counts, rates, and trend of child drownings. While we use information from death certificates to supplement the outcome status of cases identified through fire department reports (described above), we do not add otherwise unreported drowning cases to the incidence database. Thus, the mortality data can help to measure the accuracy and completeness of the incidence surveillance system for the cases who die. However, the case definitions used for vital statistics differ slightly compared to those used in the incidence data.

Customarily, mortality data show deaths of the resident population during a given year. However, for this report we present an unconventional analysis that more precisely reflects the local, year-to-year findings. We reviewed Arizona death statistics to find child cases who died in Arizona, regardless of where they resided, and we include only the cases whose <u>incident</u> occurred in Maricopa County. Thus, we present

[9] For consistency with methods used in previous years, we do not add the "missed" cases to the incidence surveillance database.

the local rates of drowning deaths, regardless of residency. To calculate the mortality rate, we divided the count by the estimated number of children age 0-4 each year residing in Maricopa county. This method improves the accuracy of identifying locally occurring events which is important for the Coalition that relies upon this surveillance system to provide yearly feedback about the effectiveness of their prevention programs.

Figure 10 (see next page) shows these drowning death rates for children under five years of age.[10] The data are shown for drownings in all bodies of water, and separately for drownings that occurred in swimming pools (including spas), and in bodies of water other than pools and spas.[11] In 2015, the Maricopa drowning rate for all bodies of water decreased slightly to 3.3 deaths per 100,000 resident children. Similarly, the death rate for pools decreased slightly to 2.6 deaths per 100,000 children. For comparison, the goal *of Healthy Arizona 2010* was to reduce drowning fatalities to no more than 0.9 deaths per 100,000 young children.[12,13] Maricopa County's drowning rate in the first half of the 2010's remains about 4 times higher than that statewide goal. Nonetheless, the overall decline in the pool death rate during the past 3 decades looks generally similar to the decline in the rate of pool incidents reported by the fire departments shown in **Figure 3**.

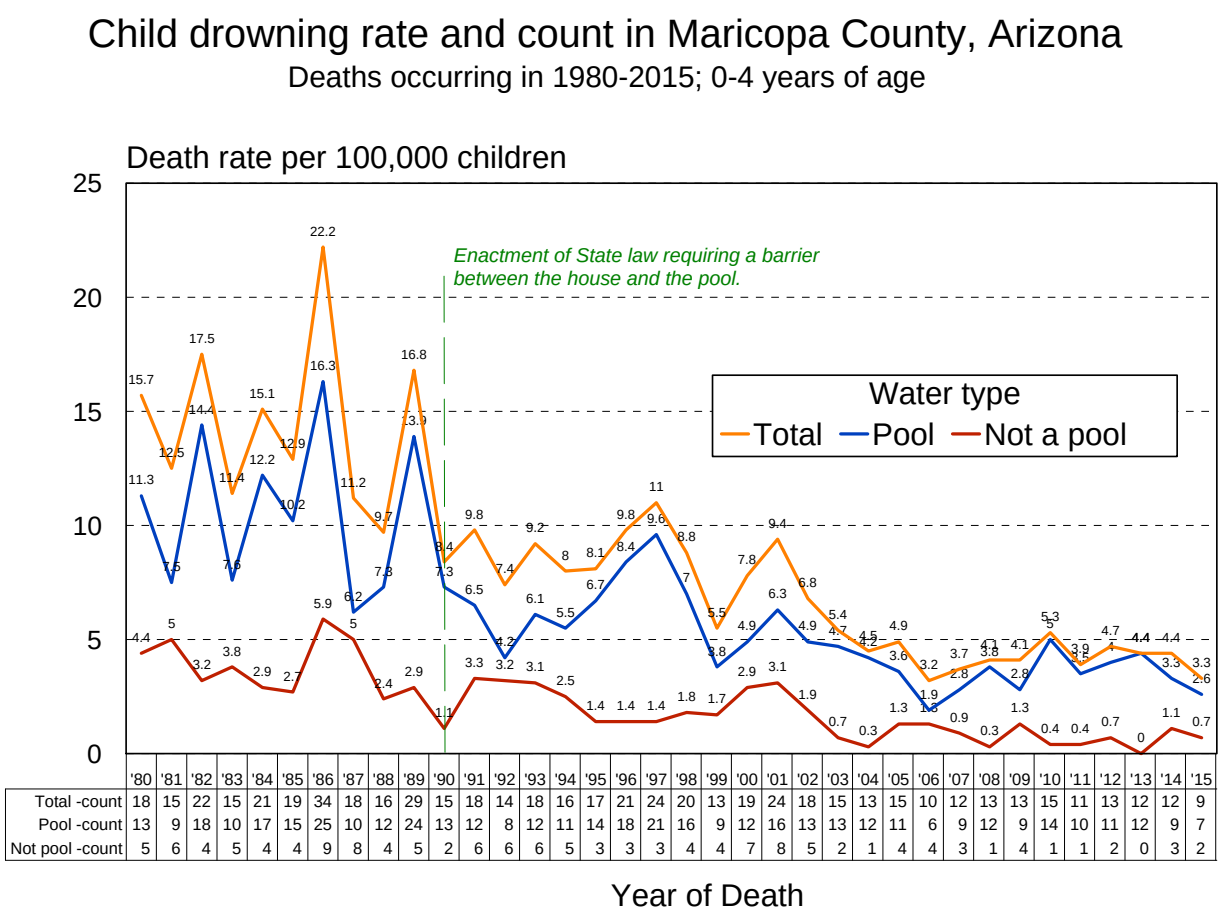
[10] To calculate this rate, the numerator includes non-residents and Arizona residents, age 0-4 years old, whose death occurred in Maricopa County. The denominator, however, is the Maricopa County population of children 0-4 years old. We chose this unconventional method for calculating the rate because we occasionally encounter nonresident visitors whose incident and death occurred in Maricopa county. We count these cases because the Drowning Prevention Coalition is focused on reducing the number of local incidents regardless of whether the child is a county resident or a visitor.

[11] Here we consider a hot tub or spa in the same category as swimming pool.

[12] U.S. Department of Health and Human Services. *Healthy People 2010*, 2nd ed., Volume 2. Injury Prevention, Section 15-29: Reduce Drownings, page 15-40. U.S. Government Printing Office, November 2000.

[13] ADHS Injury Surveillance and Prevention Plan, 2002-2005. The plan was developed within the Bureau of Emergency Medical Services.

Figure 10. Drowning death rate for children, 0-4 years of age, where the occurrence of the death and the incident was in Maricopa County. [Data Source: ADHS, Vital Statistics, death certificates coded with underlying cause of death as: E830, E832, or E910 (prior to year 2000); or W65-W74, V90-V92, or Y21 (year 2000 and later). Manner of death: accidental or undetermined].



	'80	'81	'82	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12	'13	'14	'15
Total -count	18	15	22	15	21	19	34	18	16	29	15	18	14	18	16	17	21	24	20	13	19	24	18	15	13	15	10	12	13	13	15	11	13	12	12	9
Pool -count	13	9	18	10	17	15	25	10	12	24	13	12	8	12	11	14	18	21	16	9	12	16	13	13	12	11	6	9	12	9	14	10	11	12	9	7
Not pool -count	5	6	4	5	4	4	9	8	4	5	2	6	6	6	5	3	3	3	4	4	7	8	5	2	1	4	4	3	1	4	1	1	2	0	3	2

DISCUSSION

The rates of child incidents and deaths in pools in Maricopa county for the early part of the 2010 decade have been cut by a half compared to the rates seen in the 1980's or 1990's. Conversations with the Board of the Drowning Prevention Coalition of Arizona have not identified a specific factor that explains this favorable trend. However, we believe that a combination of factors contributes to this trend: pool safety awareness campaigns sponsored by private and public sectors; intense media support in reporting individual incidents; widely publicized prosecution of cases of gross negligence; prompt use of CPR; and the accumulating, favorable impact of pool barrier laws passed in the early 1990s. The data suggests that further reduction of the drowning death rate could be achieved through wider use of barriers (eg, fences) and maintaining the integrity of gates that lead to the pool.

In 2009 Brenner et al published findings that showed a reduced risk of drowning among children age 1-4 years who received formal swim lessons compared to children who had not received such lessons.[14] The Maricopa surveillance system does not determine the swimming ability of the young children. The Coalition may wish to consider adding this promising protective factor to the data collected locally.

[14] Brenner RA, Taneja GS, Haynie DL, et al. Association between swimming lessons and drowning in childhood. Arch Pediatr Adolesc Med. March 2009; 163(3);203-210.

INCIDENT REPORT FORM: DROWNING OR NEAR-DROWNING IN ARIZONA – 2015

DATE OF INCIDENT (MM/DD/YR) _____ HOUR (24:00) __:__ AGE (yrs) _____ SEX ___

INCIDENT # _____

*PLAT or ZIP CODE*_____

(Reporting agency) _____ FIRE DEPT.

CITY OF INCIDENT:
( ) Chandler ( ) Mesa ( ) Rural area
( ) Gilbert ( ) Peoria ( ) Scottsdale
( ) Glendale ( ) Phoenix ( ) Tempe
( ) Other:_____

RACE/ETHN:
( ) Hispanic ( ) White ( ) Amer. Indian
( ) Black ( ) Asian/PI ( ) Unknown
( ) Other: _____

WATER TYPE:
( ) Pool--in ground ( ) Spa
( ) Pool--above ground ( ) Bathtub
( ) Canal or Irrigation Ditch ( ) Bucket
( ) Lake ( ) Other: _____

AT WHOSE HOME DID INCIDENT OCCUR:
( ) Victim's Home ( ) Neighbor's
( ) Relative's ( ) Friend's
( ) Not at a home _____

TYPE OF DWELLING OR FACILITY:
( ) Single Home ( ) Apt/Condo
( ) Hotel/Motel ( ) Other: _____

ATTIRE OF VICTIM: ( ) Swimwear
( ) None ( ) Other Clothes

PATIENT'S ACTIVITY AND LOCATION IMMEDIATELY PRIOR TO INCIDENT:
( ) Swimming ( ) Playing inside
( ) Bathing ( ) Playing outside
( ) Other: _____

CHILD SUPERVISION AT TIME OF INCIDENT:
( ) Mother ( ) Father ( ) N/A
( ) Other (Specify) _____

SUPERVISOR'S ACTIVITY PRIOR TO INCIDENT:
( ) Sleeping ( ) Watching TV ( ) On phone
( ) Yard work ( ) Housework ( ) Other: _____

STATUS OF PATIENT WHEN FOUND IN WATER:
( ) Submerged ( ) Floating
( ) Struggling ( ) Unknown
( ) Other: _____

RESPIRATORY EFFORT WHEN PULLED FROM WATER:
( ) Present ( ) Absent

ESTIMATED DURATION OF ANOXIA: __

RESCUER(S) ACTIONS PRIOR TO FD ARRIVAL:
( ) Chest compressions AND breaths (CPR)
( ) Chest compressions only
( ) Rescue breaths only
( ) None attempted ( ) Unknown

For pool incidents at dwellings AND patient < 6 y/o:

BARRIER	IS IT PRESENT?
Fence between house and pool	( ) Yes ( ) No
Gates Self-Close with Latch	( ) Yes ( ) No
Gates Work Properly	( ) Yes ( ) No
House Doors Self-Close with Latch	( ) Yes ( ) No
Doors Work Properly	( ) Yes ( ) No
Pool Cover, Type: _____	( ) Yes ( ) No
Door or Window Alarm	( ) Yes ( ) No

LIKELY METHOD OF ACCESS TO POOL OR SPA:
( ) Supervisor allowed child into pool or deck area
( ) No barrier -- child wandered in
( ) Climbed (specify): _____
( ) Child entered unsecured or propped gate
( ) Other: _____

DISPOSITION (if known):
( ) D.O.A.
( ) Transported to: _____
( ) Died in E.D. ( ) Admitted
( ) Treated as outpatient and released
( ) P.O.V. transport to: _____
( ) Evaluated and left on-scene

FOLLOW-UP & DATE PATIENT WAS LAST SEEN:
( ) Died _____ / _____ / _____
( ) No Impairment _____ / _____ / _____
( ) Impairment _____ / _____ / _____

DESCRIBE THE APPARENT CIRCUMSTANCES (how/why it happened; how child was found & revived):_____ (Initials)

_____ _____

_____ (Today's Date)

_____ _____

Fax completed forms to ADHS (602)-364-0082. Additional forms available www.azdhs.gov/phs/phstats/meddir/